EPCRA Section 313 Toxic Release Inventory Reporting
Naval Base San Diego
Reporting Year 2020

1.0 PURPOSE

This document summarizes the results of Toxic Release Inventory (TRI) compliance reporting efforts for Naval Base San Diego (NBSD) for Reporting Year (RY) 2020. Annual TRI reporting is governed by regulations established under Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA), as interpreted by United States (U.S.) Department of Defense (DoD) and Department of Navy (Navy) policy and guidance. This document was prepared by Multi-Media Environmental Compliance Group (MMEC Group) under Contract Number N62470-16-D-2405, Delivery Order N6247318F4764.

2.0 LOCATION

NBSD is in the City of San Diego and in National City on the eastern side of San Diego Bay, southeast of the Coronado Bay Bridge. NBSD provides shore support and berthing facilities to the operating forces of the U.S. Pacific Fleet. NBSD's 13 piers encompass 12 miles of the 1,029 land acres used by the base.

3.0 MISSION

The mission of NBSD is to provide appropriate logistical support for the operating forces of the Navy, dependent activities, and other commands as assigned. NBSD provides pier space, waterfront operational services, supply services, and security for U.S. Pacific Fleet surface vessels, living quarters for sailors and officers, and other shore-based support activities such as an exchange and a commissary.

4.0 PRIMARY ORGANIZATIONS/ACTIVITIES LOCATED AT THE FACILITY

NBSD is home port to approximately 59 ships, including various ships of the Military Sealift Command (MSC), and research and auxiliary vessels.

NBSD is also home to 214 separate tenant commands and other Navy support facilities, each with specific and specialized fleet support missions. The base is a workplace for approximately 40,000 military, civilian, and contract personnel. Additionally, the base has room to house more than 6,500 men and women in apartment-like barracks. Major organizations at NBSD include the following:

- Naval Supply Systems Command (NAVSUP) Fleet Logistics Center (FLC)
- Southwest Regional Maintenance Center (SWRMC), which includes:
  - The former Supervisor of Shipbuilding, Conversion, and Repair (SUPSHIP)
  - The former Shore Intermediate Maintenance Activity (SIMA)
  - Consolidated Divers Unit
- Naval Facilities Engineering Systems Command Southwest (NAVFAC SW)
- Navy Construction Regiment NINE and Naval Construction Battalion Maintenance Unit (CBMU) – 303
- Naval Computer and Telecommunications Station (NCTS)
- Defense Distribution Depot (DDDC) San Diego, California (CA)
- Distribution Services San Diego (DSSD), formerly Defense Reutilization and Marketing Office (DRMO)

- Training Support Center
- Navy Exchange (NEX)
- Morale, Welfare, and Recreation (MWR)
- Steam and Electricity Co-generation (COGEN) Plant (closed in 2018)

5.0 RECENT TRI REPORTING HISTORY

NBSD submitted U.S. Environmental Protection Agency (USEPA) Form Rs for lead for reporting years 2008–2019.

NBSD also submitted a Form R for ammonia for reporting years 2013–2018.

6.0 HAZARDOUS MATERIAL AND TRI CHEMICAL DATA

TRI requires submittal of a USEPA Form R for any listed toxic chemical exceeding one of the following thresholds:

- 25,000 pounds (lb) per year for chemicals manufactured onsite
- 25,000 lb per year for chemicals processed onsite
- 10,000 lb per year for chemicals otherwise used onsite
- 100 lb per year for per- and polyfluoroalkyl substances (PFAS)
- Chemical-specific thresholds for persistent bioaccumulative toxic (PBT) chemicals
  - 0.1 gram per year for dioxin and dioxin-like compounds
  - 10 lb per year for benzo[g,h,i]perylene, chlordane, heptachlor, hexachlorobenzene, isodrin, mercury, mercury compounds, octachlorostyrene, pentachlorobenzene, polychlorinated biphenyls (PCBs), and toxaphene
  - 100 lb per year for aldrin, lead, lead compounds, methyoxychlor, pendimethalin, polycyclic aromatic compounds (PACs), tetrabromobisphenyl A, and trifluralin

Section 7321 of the National Defense Authorization Act (NDAA) for fiscal year 2020 (P.L.116-92) added 172 individual PFAS chemicals to the TRI list of chemicals with an effective date of January 1, 2020. RY2020 Form R reporting is required for any of these PFAS chemicals individually manufactured, processed, or otherwise used in quantities exceeding 100-lb-per-year. The NBSD TRI threshold evaluation for these chemicals is presented in Section 6.4.

Per USEPA instruction, the TRI manufactured, processed, and otherwise used chemical threshold evaluations are performed independently. For example, the amount of an individual TRI chemical manufactured is not counted toward the amount processed or the amount otherwise used.

From a TRI perspective, toxic chemicals are primarily otherwise used at NBSD. There is some processing of toxic chemicals and, to a much lesser extent, toxic chemical manufacture in the form of combustion byproducts (discussed in Section 8.0). Otherwise used and processed toxic chemicals at NBSD are addressed in the remainder of Section 6.0 and summarized in Section 7.0.

Hazardous materials for most NBSD organizations are distributed from the NAVSUP FLC Hazardous Material Minimization (HAZMIN) Center located at Building 3322. Fuels are not supplied through the HAZMIN Center. SWRMC obtains hazardous materials from sources other than the HAZMIN Center. TRI chemical usage associated with hazardous materials issued from the HAZMIN Center is addressed in Section 6.1. TRI chemical usage associated with SWRMC,

fuels and fire suppression is addressed in Sections 6.2, 6.3 and 6.4 respectively. Also, munitions use at the NBSD Small Arms Range (SAR) is tracked separately (Section 6.5). Additionally, bilge water and other oily wastes are received from offsite sources at the NBSD oily waste plant (NBSD OW) for treatment. TRI chemicals in wastes received from offsite must be addressed in the TRI threshold evaluation (Section 6.6). Finally, TRI chemical use by the Naval Facilities Engineering Systems Command (NAVFAC) Transportation Shop is addressed in Section 6.7.

6.1 HAZMIN Center

Data regarding 2020 TRI chemical quantities issued to NBSD activities through the HAZMIN Center were obtained from the Enterprise Resource Planning (ERP) database by Charles Roiz of NAVSUP FLC. Table 1 presents a TRI chemical summary of these data.

ERP is a data management system implemented by NAVSUP FLC in 2012. It tracks HAZMIN Center issuance of hazardous materials to individual organizations both on base and off base. Information captured includes date of issue, number of containers issued, and total issue weight. Chemicals in each hazardous material issue are tracked using and Safety Data Sheet (SDS) information maintained within ERP. Quantities of individual chemicals issued to NBSD work centers and shops can be determined for the calendar year with the ERP Usage Report (ZRMIM0010). When additional details are required to track a specific chemical, the ERP Transaction History Report (ZRMMD0006) can be used to identify the shops using the chemical and the specific hazardous materials that contain the chemical.

NAVSUP FLC personnel ran the ERP Usage Report for calendar year 2020 at NBSD. MMEC Group personnel sorted and summed these data to yield individual chemical issue quantities (by Chemical Abstracts Service [CAS] number) for each chemical in the hazardous materials issued during the year. From these data, TRI chemical issues for 2020 were compiled using MMEC Group's comprehensive listing of TRI chemicals and compound categories by CAS number.

Only "301" and "501" transactions from the HAZMIN Center were extracted from the ERP Usage Report. These transactions represent hazardous material issues from the HAZMIN Center to the work centers (301 "bin issues") and direct issues to the work centers that do not physically pass through the HAZMIN Center (501 "issues"). Scrapped items ("551") and bin-to-bin transfers ("309") were not extracted from the ERP Usage Report, because that would constitute double counting according to NAVSUP FLC personnel.

The results in Table 1 do not include TRI chemicals issued to ships ported at NBSD or other offsite locations. Materials issued to ships from the HAZMIN Center become part of the ship's operation and are not counted toward the shore installation's threshold. The following quotation is from the Office of the Chief of Naval Operations Environmental Readiness Program Manual (OPNAV M-5090.1), Chapter 26-1.3, page 26-3:

> *Any toxic chemical stored or used aboard a ship while in port does not become part of the shore facility's threshold calculations and is not reported by the shore facility even if reporting is triggered. Material maintained under the ship's custody is not subject to any EPCRA reporting requirements.*

The quantities of lead and lead compounds presented in Table 1 do not include quantities from batteries in the ERP Usage Report. Motor vehicle batteries are covered under the TRI motor vehicle maintenance exemption and the article exemption. Other batteries are also covered under the article exemption.

Table 1. NBSD TRI Chemical Quantities Calculated from Hazardous Material Issued from the HAZMIN Center

TRI Chemical	2020 Total Chemical Issued (lb)
Aluminum (fume or dust)	4
Aluminum oxide	2,209
Ammonia	40
Antimony	---
Antimony compounds	96
Arsenic	---
Barium compounds	11
Benzene	17
N-Butanol	708
Cadmium	6
Chromium	---
Chromium compounds	66
Copper	5
Copper compounds	13
Cumene	14
Diisocyanates	---
Diphenylamine	1
Ethylbenzene	2
Ethylene glycol	760
Glycol ethers	584
n-Hexane	252
Hydroquinone	4
Lead	6
Lead compound	---
Manganese	---
Manganese compounds	31
Mercury	---
Mercury compounds	---
Methanol	89
Methylene chloride	---
Methyl methacrylate	---
Methyl isobutyl ketone (MIBK)	2
N-methyl-2-pyrrolidone	---
Naphthalene	2
Nickel	1
Nickel Compounds	95
Nonylphenol	23
Phenol	---
Sodium nitrite	---
Tetrachloroethylene	13
Toluene	470
1,2,4-Trimethylbenzene	172
Trichloroethylene	13
Xylene	13
Zinc (fume or dust)	62
Zinc compounds	145

lb = pound(s); TRI = Toxic Release Inventory

The quantity of zinc (fume or dust) presented in Table 1 includes only elemental zinc in powder coatings. All other elemental zinc identified in the ERP Usage Report is not in fume or dust form. Only zinc in fume or dust form is considered a TRI chemical.

A total of 2,209 lb of aluminum oxide were used at NBSD in 2020 according to the ERP data; however, this chemical must be in fibrous form to be considered a TRI chemical. Per USEPA TRI instructions, fibrous refers to a man-made form of aluminum oxide that is processed to produce strands or filaments that can be cut to various lengths depending on the application. All but 217 lb of the aluminum oxide used at NBSD are in crystalline, non-fibrous form for abrasive blasting operations.

N-Methyl-2-pyrrolidone is contained in a paint-stripping agent (Aerostrip 5182) previously used by the SWRMC Weapons Shop. The Aerostrip 5182 was held in a small, 400-gallon (gal) dip tank within Building 3278, in which various parts were depainted. Based on discussions with SWRMC personnel, this small dip tank was taken out of service in 2018 and removed from the building in 2020.[1] A new dip tank has been ordered for use at Building 3278 but will be used to apply varnish, Esterlite 605, which does not contain any TRI chemicals.[2]

To replace the small dip tank in Building 3278, a large dip tank for depainting was constructed at the SWRMC Corrosion Control Shop (Building 123). It was intended to hold Aerostrip 5182. However, the tank was never put into use and was removed to be replaced by a smaller dip tank in the future. All paint stripping will take place at Building 123 once the smaller dip tank arrives.

6.2 Southwest Regional Maintenance Center Contractors

SWRMC (SUPSHIP) is the Navy organization overseeing contractors that repair ships. Toxic chemicals used by contractors working for SWRMC on boats in drydock are not exempt from TRI reporting (in contrast to toxic chemicals used by sailors in their routine operation and maintenance of watercraft). To quantify NBSD SWRMC contractor toxic chemical usage, data from SWRMC's 2020 hazardous material usage spreadsheets were coupled with toxic chemical composition data extracted from SDSs for the items used. SWRMC requires contractors to provide information on hazardous material usage and chemical composition to meet reporting requirements under state and local air pollution regulations. The SWRMC data are divided into six material categories discussed individually in Sections 6.2.1 through 6.2.6 and summarized in Tables 2 and 3 in Section 6.2.7.

6.2.1 SWRMC Welding Materials

A total of 20,174.5 lb of welding rods and other similar materials were used by SWRMC contractors in 2020 at NBSD. Usage data for individual welding materials were combined with chemical composition data in the 2020 SWRMC Weld Rod Emissions Inventory Excel® Workbook to yield the TRI chemical quantities in Table 2. These metals are counted toward the processed threshold because they are intended to stay with the product of the operation – repaired ships.

[1] Email conversation between Michael Manese, SWRMC Industrial Environmental Specialist, and Natalie Baum, MMEC Group, on May 15, 2020 and Samantha Lui, NBSD Air Quality Program Manager, and Natalie Baum, MMEC Group, on June 28, 2021.

[2] Data on new dip tank and product supplied by Samantha Lui, NBSD Air Quality Program Manager on July 6, 2021.

6.2.2 SWRMC Solvents

A total of 925 gal of solvents were used by SWRMC contractors in 2020 at NBSD. Usage data for individual solvents (obtained from the 2020 SWRMC Coatings-Solvents Excel Workbook) were combined with chemical composition data obtained from SDSs to yield the TRI chemical usage quantities in Table 3.

6.2.3 SWRMC Abrasives

A total of 2,872 tons of abrasive materials were used by SWRMC contractors in 2020 at NBSD, according to the 2020 Abrasive Blasting Excel® Workbook. Abrasive material use breaks down as follows for 2020:

- "Kleen Blast" (produced by CanAm Minerals) accounted for 35 tons.
- Copper slag accounted for 2,394 tons.
- Aluminum oxide accounted for 59 tons.
- Steel shot accounted for 360 tons.
- Garnet accounted for 24 tons.

The SDS for Kleen Blast (produced by CanAm Minerals, Inc.) indicates no TRI chemicals at concentrations above EPCRA Section 313 de minimis levels, except aluminum oxide at 5.7 percent (%) and lead at 3.3 milligrams per kilogram (mg/kg). Lead does not have a de minimis limit. Aluminum oxide is a TRI chemical only when in fibrous form. Per USEPA TRI instructions, fibrous refers to a man-made form of aluminum oxide that is processed to produce strands or filaments that can be cut to various lengths depending on the application.[3] The SDS indicates that Kleen Blast is an iron-calcium-silicate (complex silicate) with fused oxides of silicon, iron, calcium, aluminum, and magnesium. USEPA TRI guidance indicates that aluminosilicates, aluminoborosilicates, zeolites, aluminum silicate hydroxides, and other related materials (either naturally occurring or prepared by fusion at high temperatures) are not considered fibrous.[4] Therefore, only lead need be accounted for in the Kleen Blast, and quantities are calculated as follows:

- 35 tons x 2,000 lb/ton x 3.3 lb/1,000,000 lb = 0.2 lb lead

The SDS for copper slag (produced by CanAm Minerals, Inc.) indicates no TRI chemicals at concentrations above de minimis levels. Again, copper slag contains aluminum oxide (5.7%), but it is not believed to be in fibrous form. This is also the case for the aluminum oxide (produced by K-Deer LA, Inc.) abrasive used.

The SDS for steel shot (produced by Ervin Industries, Inc.) lists manganese at 0.35 to 1.20%, which straddles the de minimis limit of 1.0%. To calculate the amount of manganese in the steel shot, TRI guidance provided by USEPA is used as follows:[5]

- 360 ton x 2,000 lb/ton = 720,000 lb steel shot
- [720,000 lb steel shot x (0.012 – 0.0099) / (0.012 – 0.0035)] x [(0.012 + 0.01) / 2] = 1,957 lb manganese

The SDSs for garnet (produced by Mohawk Garnet, Inc.) indicates that it contains no TRI chemicals.

[3] It is unlikely that fibrous forms of aluminum oxide would be effective as an abrasive material.

[4] *EPCRA Section 313 Questions and Answers, 2019 Consolidation Document*, EPA 745-B-19-001, April 2019, page 214, Question 526.

[5] *Toxic Chemical Release Inventory Reporting Forms and Instructions, Revised 2019 Version*, EPA 740-B-19-037, January 2020, page 24.

6.2.4 SWRMC Paints

A total of 27,673 gal of paints were used by SWRMC contractors in 2020 at NBSD. Usage data for individual paints (obtained from the 2020 SWRMC Coatings-Solvents Excel Workbook) were combined with chemical composition data obtained from their SDSs to yield the TRI chemical usage quantities in Tables 2 and 3:

The metal compounds in the paints are counted toward the processed threshold because they are intended to stay with the product of the operation (repaired ships). The solvents are considered otherwise used.

6.2.5 SWRMC Diesel Fuel Use in Non-Motor-Vehicle Internal Combustion Engines

A total of 43,233 gal of diesel fuel were used by SWRMC contractors in 2020 at NBSD in various devices, some that are self-propelled and others that are not. This value was obtained from the 2020 SWRMC EPCRA Fuel Usage Excel Workbook.

Only fuel used in motor vehicles (i.e., self-propelled) is considered exempt under EPCRA Section 313. It was assumed that all 43,233 gal of diesel fuel were used in non-motor vehicles. The composition of diesel fuel was assumed to be the same as that of diesel at Naval Base Point Loma (i.e., 0.55% naphthalene and 0.55% ethylbenzene, based on SDSs for several Exxon/Mobil diesel products). Naphthalene and ethylbenzene usage quantities in SWRMC diesel equipment were calculated on the basis a densities of 7.3 lb/gal and 0.55%, respectively, and presented in Table 3.

6.2.6 SWRMC Adhesives

A total of 5,969 lb of adhesives were used by SWRMC contractors in 2020 at NBSD. Usage data for individual adhesives (obtained from the 2020 SWRMC Emissions Inventory Adhesives Report Excel Workbook) were combined with chemical composition data obtained from their SDSs to yield the TRI chemical usage quantities in Table 3.

6.2.7 TRI Chemical Summary for SWRMC at NBSD

The TRI chemical usage totals from the preceding SWRMC categories yield the processed and otherwise used totals in Table 2.

Table 2. SWRMC TRI Processed Chemicals

Chemical	Welding (lb)	Paints (lb)	Total (lb)
Manganese	377	0	377
Chromium	1,176	0	1,176
Nickel	415	0	415
Copper	46	0	46
Aluminum	277	0	277
Zinc Compounds	0	0	0
Copper Compounds	0	1,362	1,362
Nickel Compounds	0	5,778	5,778
Antimony Compounds	0	20	20

lb = pound(s)

Table 3. SWRMC TRI Otherwise Used Chemicals

Chemical	Solvents (lb)	Paints (lb)	Adhesives (lb)	Abrasives (lb)	Diesel Engine (lb)	Total (lb)
1,2,4-Trimethylbenzene	32	0	0	0	0	32
Ethylbenzene	0	0	0	0	1,735	1,735
MIBK	0	0	0	0	0	0
n-Butanol	32	0	0	0	0	32
Toluene	0	0	97	0	0	97
Xylene	1,408	0	0	0	0	1,408
Cumene	5	1,929	0	0	0	1,934
Methanol	0	6,780	0	0	0	6,780
Lead	0	0	0	0.2	0	0.2
Manganese	0	0	0	1,957	0	1,957
Naphthalene	0	32	0	0	1,735	1,767
Dibutyl Phthalate	0	212	5	0	0	217
n-Hexane	0	0	120	0	0	120

lb = pound(s)

6.3 Fuels

Fuel use at NBSD is primarily limited to diesel fuel and gasoline. Most, but not all, of this fuel is covered under the TRI motor vehicle maintenance exemption. Additionally, no airfield is located at NBSD. As such, there is no possibility of transient aircraft jet fuel use at this installation. Also, no ships are fueled, and no fuel farm is located at NBSD. Ships homeported at NBSD are fueled at the Defense Fuel Supply Point (DFSP) Point Loma main fuel depot or at sea using barges fueled from the DFSP Point Loma. Therefore, there is no possibility of transient ship fueling at NBSD.

6.3.1 Diesel Fuel

This material typically contains TRI chemicals such as naphthalene and ethylbenzene in concentrations above their de minimis levels; however, it is primarily used in TRI-exempt activities such as motor vehicle fuel and building heating. Fuels used for heating of buildings (diesel fuel may be used as a backup fuel to natural gas for heating purposes) are exempt from reporting under the TRI personal use exemption (i.e., the fuels are used to provide personal comfort).[6]

Fuels that are distributed and used within DoD organizations are considered otherwise used.[7] Diesel fuel for motor vehicle use is available at the NAVFAC Transportation Shop filling station (Building 305), but is covered under the motor vehicle maintenance exemption.[8] This fuel is accessible only via electronic key assigned to each specific Government-owned vehicle at

[6] *Getting Started with The Emergency Planning and Community Right-to-Know Act (EPCRA) – A Basic Guidance Document for Navy Facilities*, May 2009, page 32.

[7] *How to Consider Fuel Thresholds under EPCRA Section 313, June 2010, page 5. This is an addendum to the Navy's Getting Started with The Emergency Planning and Community Right-to-Know Act (EPCRA) – A Basic Guidance Document for Navy Facilities*, May 2009.

[8] *How to Consider Fuel Thresholds under EPCRA Section 313, June 2010, pages 5 and 6. This is an addendum to the Navy's Getting Started with The Emergency Planning and Community Right-to-Know Act (EPCRA) – A Basic Guidance Document for Navy Facilities*, May 2009.

NBSD; thus, the fuel is restricted to NBSD vehicles and cannot be provided to transient vehicles.

There are some non-motor-vehicle, non-exempt uses of diesel fuel at NBSD such as emergency generators, welders, pumps, air compressors, and floating cranes (the cranes require pusher boats to move them). Diesel fuel quantities used in these various items totaled 56,924 gal for 2020 according to NBSD Air Quality Program Manager.[9]

The composition of diesel fuel was assumed to be the same as that of diesel fuel at Naval Base Point Loma (i.e., 0.55% naphthalene and 0.55% ethylbenzene based on SDSs for several Exxon/Mobil diesel products). Naphthalene and ethylbenzene usage quantities in diesel equipment were calculated as follows based on a density of 7.3 lb/gal and 0.55%:

- Ethylbenzene – 2,285 lb (otherwise used)
- Naphthalene – 2,285 lb (otherwise used)

6.3.2 Gasoline

Gasoline is available at the two Navy Exchange (NEX) gas stations and the NAVFAC gas station. Typically, this material contains numerous TRI chemicals at concentrations above de minimis concentrations; however, as with diesel fuel, its use in facility motor vehicles is covered under the motor vehicle maintenance exemption.

The NEX gas stations are open only to active and retired military personnel and their families. TRI chemical use at these locations is covered under two TRI exemptions – the motor vehicle maintenance exemption and the personal use exemption. The TRI personal use exemption applies to *"personal use by employees or other persons at the facility of food drugs, cosmetics, or other personal items containing toxic chemicals, including supplies of such products within the facility such as in a facility operated cafeteria, store or infirmary."*[10] The NEX gas stations qualify as company-operated stores. Also, NEX gas station customers are on base for some purpose other than refueling and, therefore, are not classified as transient as defined by Navy TRI policy. While at the base, they are under the operational control of the base. They are not using the base as a "gas station or rest stop." Therefore, fueling at the NEX is also covered under the TRI motor vehicle maintenance exemption.

Gasoline is used to fuel welders and street stripers at NBSD. Neither of these items is covered under the TRI motor vehicle exemption. Gasoline quantities used in these various items totaled approximately 230 gal for 2020, according to the NBSD Air Quality Program Manager.[11]

This information was combined with gasoline chemical composition data from River City Petroleum (which supplies Naval Air Station North Island [NASNI] with gasoline) to yield the following TRI chemical use data:

- 3% ethylbenzene x 230 gal x 6.17 lb/gal = 43 lb (otherwise used)
- 2.5% benzene x 230 gal x 6.17 lb/gal = 35 lb (otherwise used)
- 3% n-hexane x 230 gal x 6.17 lb/gal = 43 lb (otherwise used)
- 1% naphthalene x 230 gal x 6.17 lb/gal = 14 lb (otherwise used)
- 3% 1,2,4-trimethylbenzene x 230 gal x 6.17 lb/gal = 43 lb (otherwise used)

[9] Data provided by Samantha Lui, NBSD Air Quality Program Manager, to MMEC Group, June 22, 2021.

[10] 40 Code of Federal Regulations (CFR) 372.38 (c), (3) and *Getting Started with EPCRA,* U.S. Navy, May 2009, page 32.

[11] Data provided by Samantha Lui, NBSD Air Quality Program Manager, to MMEC Group, June 22, 2021.

- 7.5% toluene x 230 gal x 6.17 lb/gal = 106 lb (otherwise used)
- 7.5% xylene x 230 gal x 6.17 lb/gal = 106 lb (otherwise used)

6.4 Fire Suppression

For RY2020, 172 PFAS chemicals were added to the list of TRI chemicals that must be considered in the TRI threshold evaluation. PFAS chemicals have been a critical ingredient in aqueous film-forming foam (AFFF) used for fighting petroleum fires at airfields, aboard ships, and in industrial processes; however, the use of these chemicals is being phased out and restricted. AFFF is kept on hand at multiple locations throughout NBSD for use in emergency fire suppression. These locations are listed in Table 4.

Table 4. AFFF Additions to NBSD Units in 2020

Building/Location	Volume (gal)	New AFFF Brand	Replacement Volume (gal)
Fire Station 16/ Engine 16	25	Ansulite AFC-3MS	25
Fire Station 16/ Engine 161	70	Ansulite AFC-3MS	70
Fire Station 18/ Engine 18	70	Ansulite AFC-3MS	70
Fire Station 18/ Brush 18	20	NA	NA

AFFF = aqueous film-forming foam; gal = gallon(s); NA = not applicable

For TRI purposes, reportable uses of AFFF at NBSD are as follows:

- Emergency use in fire suppression
- Firefighting training activities
- Additions of AFFF to fire suppression systems

In July 2020, a large shipboard fire at NBSD required the use of pier-side AFFF units. Based on post-event reports, 661 gal of AFFF were used by NBSD personnel to suppress the ship fire.[12] It was reported that of the 661 gal used, 110 gal were a 6% AFFF product, and the remaining 551 gal were a 3% AFFF product.

There were no firefighting training activities at NBSD in 2020.

Additionally, a large-scale effort to replace older AFFF products with a Military Specification (MILSPEC)-compliant AFFF in fire suppression systems has been in effect across Commander, Naval Region Southwest (CNRSW) installations, including NBSD. As a result, multiple systems/tanks equipped with AFFF containing PFAS chemicals at concentrations above 800 parts per billion (ppb) have been replaced with the MILSPEC-compliant AFFF.[13] These fire suppression systems were drained and refilled with a MILSPEC-compliant AFFF in 2020, as presented in Table 4. The amounts of PFAS chemicals in the MILSPEC-compliant AFFF added to these systems are counted toward the TRI reporting threshold in accordance with USEPA TRI reporting guidance relevant to closed systems.

[12] OSD AFFF Release and Response Reporting Spreadsheet, November 2020.
[13] Data provided by Christina Graulau, NAVFAC SW Environmental Compliance Core, to MMEC Group on February 4, 2021.

A total of 165 gal of MILSPEC-compliant AFFF were added to the systems listed in Table 4 at NBSD in 2020. The SDS for Ansulite AFC-3MS does list two proprietary chemical types as components of the mixture (polyfluorinated alkyl polyamide and polyfluorinated alkyl quaternary amine chloride), but does not provide Chemical Abstracts Service (CAS) numbers for these items to determine whether they are TRI-listed PFAS chemicals.[14] However, as directed by Navy guidance on PFAS chemicals, when AFFF manufactured after 2016 is used, as was the case in 2020 at NBSD, a concentration of 25 ppb is to be used to determine PFAS chemical use.[15] Applying this concentration to the quantity of AFFF added in 2020 and accidentally released yields:

- 165 gal AFFF x 3.78 liters per gallon (L/gal) x 25 micrograms per liter (µg/L) x 0.0022 lb/gram (g) ÷ 1,000,000 micrograms per gram (µg/g) = 0.000034 lb of PFAS

To determine the quantity of PFAS used in the shipboard fire, a different concentration is used for the two types of AFFF used in the event. The 3% AFFF used was listed as Phos-Chek, which would contain the same concentration of 25 ppb for PFAS as the Ansulite AFC-3MS above. Applying this concentration to the 551 gal of 3% AFFF used in the ship fire yields:

- 551 gal AFFF x 3.78 L/gal x 25 µg/L x 0.0022 lb/g ÷ 1,000,000 µg/g = 0.00011 lb of PFAS

The 6% AFFF used in the shipboard fire was listed as MILSPEC 6% AFFF. Based on this information, it is assumed this product is a Chemguard AFFF, and according to the Navy guidance on PFAS chemicals, a mid range concentration of 800 ppb is to be used to determine PFAS chemical use. Applying this concentration to the 110 gal of 6% AFFF used in the ship fire yields:

- 110 gal AFFF x 3.78 L/gal x 800 µg/L x 0.0022 lb/g ÷ 1,000,000 µg/g = 0.00073 lb of PFAS

Without individual PFAS chemicals identified in the AFFF used in 2020, the 25-ppb and 800-ppb concentrations are used for the collective quantity of PFAS chemicals. Given that the 100-lb-per-year TRI threshold was not exceeded for the collective quantity of PFAS chemicals, it was concluded that no individual PFAS chemical quantity exceeded the reporting threshold for RY2020.

To confirm the low concentration of PFAS contained in the AFFF products used in the shipboard fire event, analytical results for the wastewater collected after the fire was extinguished were reviewed. According to analytical results from samples of the wastewater, 17.2 ppb was the highest concentration of a TRI PFAS chemical detected and is similar to the PFAS concentration found in AFFF manufactured after 2016 and used in the calculations above.[16]

Additionally, the SDS for Ansulite AFC-3MS lists 2-(2-butoxyethoxy)ethanol (CAS No. 112-34-5) in the mixture at 10–30%. This chemical falls under the glycol ether TRI chemical category (N230), and its use must be considered toward the otherwise used threshold evaluation. Using the mid point of the chemical composition range, 20%, yields the following the quantity of 2-(2-butoxyethoxy)ethanol in the Ansulite AFC-3MS added to the AFFF systems and used in the ship fire event in 2020:

[14] SDS for Ansulite 3% AFFF dated January 2019 lists polyfluorinated alkyl polyamide (proprietary) at 1–5% and polyfluorinated alkyl quaternary amine chloride (proprietary) at 0.1–1%.

[15] *Guidance Document for PFAS/PFOA Reporting Under the EPCRA,* December 31, 2020.

[16] Laboratory results of ship fire wastewater supplied by Christina Graulau, NAVFAC SW Environmental Compliance Core, to MMEC Group on February 4, 2021. Approximately 473,000 gal of wastewater from the ship were collected and analyzed on July 27, 2020. Perfluorooctanesulfonic acid (PFOS), a TRI chemical, was detected at a concentration of 17,200 nanograms per liter (ng/L), which is equal to 17.2 micrograms per liter (µg/L).

- 826 gal Ansulite AFC-3MS AFFF x 1.02 x 8.34 lb/gal x 0.20 lb 2-(2-butoxyethoxy)ethanol / lb AFFF = 1,405 lb 2-(2-butoxyethoxy)ethanol

6.5 NBSD Small Arms Range

The NBSD SAR is indoors at Building 3137. Munitions use at the SAR is tracked by munitions type (e.g., 9-millimeter [mm] cartridges and 12-gauge shotgun cartridges). The annual results for 2020 were provided by MAC Joshua Albrecht (NBSD SAR (619) 556-1835). In 2020, 322,286 rounds were fired, compared with 278,494 rounds in 2019 (a 15.7% increase). The munitions data were entered by MMEC Group personnel into the DoD Toxics Release Inventory Data Delivery System (TRI-DDS) to calculate TRI chemical use at the NBSD SAR. NBSD SAR TRI-DDS chemical use results for RY2020 are as follows:

- Antimony – 53 lb
- Antimony compounds – 2 lb
- Arsenic – 1 lb
- Barium compounds – 3 lb
- Copper – 452 lb
- Lead (PBT) – 2,831.8 lb
- Lead compounds (PBT) – 4.1 lb
- Nitroglycerin – 9 lb

These quantities are counted toward the NBSD otherwise used threshold. In 2020, the lead quantity used was well in excess of its 100-lb-per-year reporting threshold, thus triggering the requirement to complete a separate USEPA Form R for lead for both the NBSD SAR and the remainder of NBSD (for any non-exempt lead usage). Per Navy guidance, although the range is considered part of the main installation facility for applicability and threshold determination, releases of TRI chemicals from range activities are to be reported on separate Form Rs from those of the main installation.

6.6 Oily Wastewater from Offsite Treated at the NBSD Oily Wastewater Treatment Plant

At NBSD, bilge water, compensation water, contaminated fuel, and other oily wastes from ships are piped in from the piers into the NBSD OW. Often, the waste is trucked from the ships to the NBSD OW. Most of this waste is generated while the vessels are docked at the piers and undergoing maintenance, but some is generated while ships are out at sea and is transferred to the NBSD OW upon arrival of the ship at NBSD. Also, some wastes are received from onsite shops, but the clear majority is from ships.

The NBSD OW is a large operation processing approximately 11 million gal of waste per year and generating approximately 787,000 gal of recovered oil that are sold to offsite entities. The oily wastewater water is first pumped through a grit removal process into Load Equalization Tanks, where the oil can be separated from the water and then transferred to Recovered Oil Storage Tanks. Water from the Load Equalization Tanks is then pumped to an oil/water separation process (plate separators and induced air floatation) where DWT 6234, DWT 672E, and sodium hydroxide are added to help break down oily emulsions and facilitate additional oil separation. (These materials do not contain any TRI chemicals.) The treated water is then discharged to City of San Diego sanitary sewers. Sludge removed from the water is pumped to a holding tank, where it is combined with grit removed from the water earlier in the process. The sludge and grit are then pumped to a filter press for dewatering. The pressed sludge is sent

offsite as a hazardous waste, and the water removed from the sludge is pumped back to the Load Equalization Tanks to be processed again. Air emissions from the NBSD OW are controlled via carbon absorption and spent carbon from this device is periodically sent offsite for regeneration.

The USEPA definition of a facility does not include water, and thus the waste received from ships must be addressed as wastes received from offsite. Additionally, DoD guidance indicates that materials stored and used on a ship that remain under the ship's ownership are not considered part of the shore-based facility. Thus, bilge water and other oily wastes received at the NBSD OW from ships must be considered received from offsite.

Per USEPA instructions, TRI chemicals in wastes received from offsite into the facility for disposal, stabilization (without subsequent distribution in commerce), or treatment for destruction must be counted toward the otherwise used threshold. However, Question and Answer #20 from USEPA's "EPCRA Section 313 Questions and Answers: Addendum to the Revised 1998 Version as of December 2004" states the following:

> *20. If a toxic chemical is derived from the phase separation of wastes received from offsite and that chemical is subsequently incorporated into a product at the facility and then distributed into commerce, has the toxic chemical been processed or otherwise used?*
>
> *If a facility receives materials containing toxic chemicals from offsite for further waste management and the toxic chemicals are treated for destruction, stabilized, or disposed onsite, the facility would be otherwise using the toxic chemicals. However, during phase separation the toxic chemical in the waste is not actually destroyed. Furthermore, the toxic chemical is incorporated into a product at the facility and is further distributed in commerce (e.g., retorted mercury sold for reuse in thermometers and mercury switches).*
>
> *Thus, as long as the toxic chemical coming from the waste is not stabilized, treated for destruction, or disposed, it would not be otherwise used because it is neither treated for destruction nor disposed of onsite. Because it is distributed in commerce, it would be processed. Once a facility exceeds a threshold for a particular toxic chemical, amounts of that chemical that are released or otherwise managed as a waste must be calculated for all onsite activities.*

Because the NBSD OW is basically a phase separation process with the resulting oil sold into commerce, the TRI chemicals in the recovered oil are considered processed and are subject to the 25,000-lb-per-year TRI reporting threshold. This quantity includes, at a minimum, all the water-insoluble organic TRI chemicals in the oil. It is unclear whether the TRI inorganic chemicals (e.g., metals and metal compounds) would also be considered processed. As a conservative approach, it is assumed that these inorganic TRI chemicals must be included in the otherwise used threshold evaluation (10,000 lb per year).

Data characterizing the volume and TRI chemical composition of the various waste streams entering the NBSD OW are not readily available. However, the amount of TRI chemicals entering the NBSD OW can be estimated using the quantity exiting in the recovered oil, plus the amount discharged to sanitary sewers and the amount in the dewatered sludge sent offsite.

A total of 787,448 gal of oil were recovered from the NBSD OW in 2020 and sold. The amounts of TRI chemicals in the NBSD OW oil were estimated from the laboratory analytical results from recovered oil samples (Table 5). For metals and organic chemicals, analytical results from samples collected from the NBSD OW recovered oil tank in 2020 were averaged (2 samples).

Table 5. TRI Chemicals in NBSD Recovered Oil

Chemical	Concentration (mg/L)	Chemical Mass in Recovered Oil (lb)
Benzene	4.3	28
Toluene	117.5	771
Ethylbenzene	216.5	1,421
m,p Xylenes	210.5	1,381
o-Xylene	402	2,638
124 Trimethylbenzene	1,680	11,025
Naphthalene	435.3	2,857
Antimony	8.4	55
Arsenic	0.1	1
Barium	0.6	4
Cadmium	0.1	1
Chromium	0.4	3
Copper	6.4	42
Lead	0.4	2.6
Mercury	0.1	0.7
Zinc	34	223

lb = pound(s); mg/L = milligram(s)/liter

A total of 11,227,213 gal of water were discharged from the NBSD OW to the City of San Diego sanitary sewer system in 2020. The amounts of TRI metals in the NBSD OW effluent can be estimated from the laboratory analytical results from NBSD OW effluent samples collected in 2020. The amounts of TRI organics in the NBSD OW effluent were estimated using results from NASNI OW effluent samples collected throughout 2020.[17] The results are presented in Table 6.

Table 6. Chemical Concentration in NBSD OW Effluent

Chemical	Concentration (mg/L)	Chemical Mass in OW Effluent (lb)
Cadmium	0.2	19
Chromium	0.02	2
Copper	0.02	2
Lead	0.003	0.3
Nickel	0.05	5
Zinc	0.1	9
Benzene	0.01	1
Ethylbenzene	0.04	4
MeCl2	0.00	0
Toluene	0.04	4
Naphthalene	0.2	19

lb = pound(s); mg/L = milligram(s)/liter

A total of 31,560 lb of dewatered sludge were generated from the NBSD OW and sent offsite for disposal in 2020. The amounts of TRI chemicals in the NBSD OW sludge were estimated from

[17] The NBSD effluent is not monitored for specific organic chemicals. It is assumed that the NBSD OW effluent would contain concentrations of organic chemicals similar to those of the NASNI OW effluent.

laboratory analytical results for samples collected in March 2019 (most recent data available) and are presented in Table 7.

Table 7. Chemical Concentration in NBSD OW Sludge

Chemical	Concentration (mg/kg)	Chemical Mass in OW Sludge (lb)
Cadmium	7	0
Chromium	614	19
Cobalt	13.6	0
Copper	10,200	322
Lead	165	5.2
Nickel	1,380	44
Zinc	7,170	226
Naphthalene	26	1
Ethylbenzene	11	0
124 TMB	148	5
Toluene	15	0
m,p Xylene	25	1
o-Xylene	7	0
Benzene	13	0
Methylene chloride	9	0

lb = pound(s); mg/kg = milligram(s)/kilograms(s)

The 2020 quantity of spent carbon from NBSD OW air pollution control devices sent offsite for regeneration was 0 lb.

The TRI chemical totals entering (and leaving) the NBSD OW are thus estimated as follows:

- Naphthalene – 2,877 lb (processed)
- Ethylbenzene – 1,425 lb (processed)
- Benzene – 29 lb (processed)
- 1,2,4-Trimethylbenzene – 11,030 lb (processed)
- Toluene – 775 lb (processed)
- Xylene – 4,020 lb[18] (processed)
- Mercury – 0.7 lb (otherwise used)
- Chromium – 24 lb (otherwise used)
- Nickel – 49 lb (otherwise used)
- Copper – 366 lb (otherwise used)
- Lead – 8.1 lb (otherwise used)
- Zinc compounds – 458 lb (otherwise used)

As stated previously, the organic TRI chemical quantities are considered processed and are evaluated against the 25,000-lb-per-year threshold; the inorganic TRI chemical quantities are

[18] This value combines quantities ortho-, meta-, and para-xylene under "xylene – mixed isomers." Currently, there is no TRI reporting advantage for NBSD in addressing the isomers separately.

considered otherwise used and are evaluated against the 10,000-lb-per-year threshold. Note that these values include a small contribution from the processing of oily wastes generated from onsite activities and not ships. This quantity does not have to be counted toward the TRI threshold, but it has been counted here (conservatively) to simplify the threshold evaluation.

6.7 NAVFAC Transportation Shop

Chemical use for maintenance of facility-based motor vehicles is exempt from TRI reporting; however, some maintenance of offsite vehicles is conducted at the NBSD NAVFAC Transportation Shop in Building 3511 that may not be exempt from TRI reporting. It was determined that roughly 20 to 25% of the vehicles serviced at the NBSD NAVFAC Transportation Shop are from offsite (primarily other Navy installations in the San Diego metro area).[19] The NAVFAC Transportation Shop obtains materials through open purchase. A review of hazardous materials stored at the facility indicated only minor quantities of vehicle maintenance materials that were unlikely to impact the threshold evaluation significantly.

7.0 TRI CHEMICAL THRESHOLD EVALUATION

Tables 8 and 9 summarize the quantities of otherwise used and processed TRI chemicals from the various organizations and data sources described in the preceding section. Per USEPA instruction, the otherwise used threshold evaluation and the processed threshold evaluation are performed independently (i.e., chemical quantities processed are not included with those otherwise used, and vice versa).

Otherwise Used Chemicals

Based on the summary in Table 8, only lead usage quantities surpassed a reporting threshold for otherwise used chemicals (10,000 lb per year for most chemicals and 100 lb per year for lead).

Processed Chemicals

Based on the summary in Table 9, no TRI chemical usage quantities surpassed a reporting threshold for processed chemicals (25,000 lb per year for most chemicals) at NBSD in 2020.

[19] This number was verified through a phone conversation with Kim Heinrich of the NAVFAC Transportation Shop and Natalie Baum, MMEC Group, on July 22, 2020.

Table 8. NBSD RY2020 TRI Otherwise Used Threshold Evaluation Summary

TRI Chemical	CAS #	HAZMIN Center (lb)	SWRMC (lb)	Fuel (lb)	SAR (lb)	AFFF (lb)	Oily Wastewater from Offsite (lb)	Total (lb)
1,2,4-Trimethylbenzene	95-63-6	172	32	43	---	---	---	247
Aluminum (fume or dust)	7429-90-5	4	---	---	---	---	---	4
Aluminum oxide	1344-28-1	217	---	---	---	---	---	217
Ammonia	7664-41-7	40	---	---	---	---	---	40
Antimony	7440-36-0	---	---	---	53	---	---	53
Barium compounds	N040	11	---	---	3	---	---	14
Benzene	71-43-2	17	---	35	---	---	---	52
Chromium	7440-47-3	---	---	---	---	---	24	24
Chromium compounds	N090	66	---	---	---	---	---	66
Copper	7440-50-8	5	---	---	452	---	366	823
Cumene	98-82-8	14	1,934	---	---	---	---	1,948
Dibutylphthalate		---	217	---	---	---	---	217
Diphenylamine	122-39-4	1	---	---	---	---	---	1
Ethylbenzene	100-41-4	2	1,735	2,328	---	---	---	4,065
Ethylene glycol	107-21-1	760	---	---	---	---	---	760
Glycol ethers	N230	584	---	---	---	1,405	---	1,989
n-Hexane	110-54-3	252	120	43	---	---	---	415
Lead (PBT)	7439-92-1	6	0.2	---	2,831.8	---	8.1	2,846.1
Lead compounds (PBT)	N420	---	---	---	4.1	---	---	4.1
Manganese	7439-96-5	---	1,957	---	---	---	---	1,957
Manganese compounds	N450	31	---	---	---	---	---	31
Methanol	67-56-1	89	6,780	---	---	---	---	6,869
Methyl isobutyl ketone (MIBK)	108-10-1	2	---	---	---	---	---	2
n-Butyl alcohol	71-36-3	708	32	---	---	---	---	740
Naphthalene	91-20-3	2	1,767	2,299	---	---	---	4,068
Nickel	7440-02-0	1	---	---	---	---	49	50
Nitroglycerin	55-63-0	---	---	---	9	---	---	9
PFAS	Several	---	---	---	---	<1	---	<1
Tetrachloroethylene	127-18-4	13	---	---	---	---	---	13
Toluene	108-88-3	470	97	106	---	---	---	673
Xylene (mixed isomers)	1330-20-7	13	1,408	106	---	---	---	1,527
Zinc (fume or dust)	7440-66-6	62	---	---	---	---	---	62
Zinc compounds	N982	145	---	---	---	---	458	603

Chemical quantities presented in **bold text** exceeded a TRI reporting threshold 2020.
CAS = Chemical Abstract Service; HAZMIN = Hazardous Material Minimization; lb = pound(s); SAR = Small Arms Range; SWRMC = Southwest Regional Maintenance Center; TRI = Toxic Release Inventory

Table 9. NBSD RY2020 TRI Processed Threshold Evaluation Summary

TRI Chemical	CAS #	HAZMIN Center (lb)	SWRMC (lb)	Fuel (lb)	SAR (lb)	Oily Wastewater from Offsite (lb)	Total (lb)
1,1,1-Trichloroethane	71-55-6	---	---	---	---	---	---
1,2,4-Trimethylbenzene	95-63-6	---	---	---	---	11,030	11,030
Aluminum oxide	1344-28-1	---	---	---	---	---	---
Antimony	7440-36-0	---	---	---	---	---	---
Antimony compounds	N010	---	20	---	---	---	20
Barium compounds	N040	---	---	---	---	---	---
Benzene	71-43-2	---	---	---	---	29	29
Chromium	7440-47-3	---	1,176	---	---	---	1,176
Chromium compounds	N090	---	---	---	---	---	---
Copper	7440-50-8	---	46	---	---	---	46
Copper compounds	N100	---	1,362	---	---	---	1,362
Cumene	98-82-8	---	---	---	---	---	---
Decabromodiphenyl oxide	1163-19-5	---	---	---	---	---	---
Ethylbenzene	100-41-4	---	---	---	---	1,425	1,425
Ethylene glycol	107-21-1	---	---	---	---	---	---
Glycol Ethers	N230	---	---	---	---	---	---
n-Hexane	110-54-3	---	---	---	---	---	---
Lead (PBT)	7439-92-1	---	---	---	---	---	---
Lead compounds (PBT)	N420	---	---	---	---	---	---
Manganese	7439-96-5	---	377	---	---	---	377
Manganese compounds	N450	---	---	---	---	---	---
Methanol	67-56-1	---	---	---	---	---	---
Methyl isobutyl ketone (MIBK)	108-10-1	---	---	---	---	---	---
n-Butyl alcohol	71-36-3	---	---	---	---	---	---
Naphthalene	91-20-3	---	---	---	---	2,877	2,877
n-Methyl pyrrolidone	872-50-4	---	---	---	---	---	---
Nickel	7440-02-0	---	415	---	---	---	415
Nickel compounds	N495	---	5,778	---	---	---	5,778
Nitroglycerin	55-63-0	---	---	---	---	---	---
Phenanthrene	85-01-8	---	---	---	---	---	---
Silver	7440-22-4	---	---	---	---	---	---
Tetrachloroethylene	127-18-4	---	---	---	---	---	---
Toluene	108-88-3	---	---	---	---	775	775
Xylene (mixed isomers)	1330-20-7	---	---	---	---	4,020	4,020
Zinc compounds	N98	---	---	---	---	---	---

CAS = Chemical Abstract Service; HAZMIN = Hazardous Material Minimization; lb = pound(s); SAR = Small Arms Range; SWRMC = Southwest Regional Maintenance Center; TRI = Toxic Release Inventory

8.0 TRI CHEMICALS MANUFACTURED AS BYPRODUCTS

TRI chemicals are manufactured in small quantities as byproducts when fuel is burned. Navy TRI policy excludes byproducts emitted from motor vehicle tailpipes from inclusion in TRI manufactured chemical quantities; however, combustion byproducts from non-motor-vehicle sources are not excluded.

Tables 10 and 11 present the quantities of TRI chemicals manufactured at NBSD in 2020 from the burning of the following:

- Natural gas = 77 million cubic feet (from six boilers)
- Diesel fuel = 100,157 gal (Sections 6.2.5, and 6.3.1)
- Gasoline = 230 gal (Section 6.3.2)

Combustion byproduct chemical quantities manufactured were calculated from USEPA AP-42 emission factors. No TRI chemical thresholds for manufactured chemicals were exceeded.

Table 10. TRI Chemicals Manufactured from Natural Gas Combustion at NBSD (2020)

CAS #	TRI Chemical	PBT	Emission Factor (lb/MMscf)	Decimal Equivalent (lb/MMscf)	2020 Natural Gas Use (MMscf/yr)	Chemical Emissions (lb/yr)	TRI Threshold Exceeded?
120-12-7	Anthracene	No	<2.4E-06	0.00000239	77	0.0	No
71-43-2	Benzene	No	2.10E-03	0.0021	77	0.2	No
25321-22-6	Dichlorobenzene	No	1.20E-03	0.0012	77	0.1	No
50-00-0	Formaldehyde	No	7.50E-02	0.075	77	5.8	No
91-20-3	Naphthalene	No	6.10E-04	0.00061	77	0.0	No
85-01-8	Phenanthrene	No	1.70E-05	0.000017	77	0.0	No
108-88-3	Toluene	No	3.40E-03	0.0034	77	0.3	No
7440-38-2	Arsenic	No	2.00E-04	0.0002	77	0.0	No
7440-39-3	Barium	No	4.40E-03	0.0044	77	0.3	No
7440-41-7	Beryllium	No	<1.2E-05	0.0000119	77	0.0	No
7440-43-9	Cadmium	No	1.10E-03	0.0011	77	0.1	No
7440-47-3	Chromium	No	1.40E-03	0.0014	77	0.1	No
7440-48-4	Cobalt	No	8.40E-05	0.000084	77	0.0	No
7440-50-8	Copper	No	8.50E-04	0.00085	77	0.1	No
7439-96-5	Manganese	No	3.80E-04	0.00038	77	0.0	No
7440-02-0	Nickel	No	2.10E-03	0.0021	77	0.2	No
7782-49-2	Selenium	No	<2.4E-05	0.000024	77	0.0	No
7440-62-2	Vanadium	No	2.30E-03	0.0023	77	0.2	No
7439-92-1	Lead	Yes 100 lb	5.00E-04	0.0005	77	0.0	No
7439-97-6	Mercury	Yes 10 lb/yr	2.60E-04	0.00026	77	0.0	No
191-24-2	Benzo[g,h,I,]perylene	Yes 10 lb/yr	<1.2E-06	0.00000119	77	0.0	No

Table 10. TRI Chemicals Manufactured from Natural Gas Combustion at NBSD (2020) (continued)

CAS #	TRI Chemical	PBT	Emission Factor (lb/MMscf)	Decimal Equivalent (lb/MMscf)	2020 Natural Gas Use (MMscf/yr)	Chemical Emissions (lb/yr)	TRI Threshold Exceeded?
Polycyclic Aromatic Compounds Category (100 lb/yr threshold)							
56-49-5	3-Methylchloranthrene	PAC	<1.8E-06	0.00000179	77	0.0	No < 100 lb/yr
57-97-6	7,12-Dimethylbenza(a) anthracene	PAC	<1.6E-05	0.000016	77	0.0	
56-55-3	Benz(a)anthracene	PAC	<1.8E-06	0.00000179	77	0.0	
50-32-8	Benzo(a)pyrene	PAC	<1.2E-06	0.00000119	77	0.0	
205-99-2	Benzo(b)fluoranthene	PAC	<1.8E-06	0.00000179	77	0.0	
205-82-3	Benzo(k)fluoranthene	PAC	<1.8E-06	0.00000179	77	0.0	
53-70-3	Dibenzo(a,h,)anthracene	PAC	<1.2E-06	0.00000119	77	0.0	
193-39-5	Indeno(1,2,3cd)Pyrene	PAC	<1.8E-06	0.00000179	77	0.0	
					PAC Total	0.0	

Chemical quantities presented in **bold text** exceeded a TRI reporting threshold 2020.

CAS = Chemical Abstracts Service; lb = pound(s); MMscf = million standard cubic foot (feet); PAC = polycyclic aromatic compound; PBT = persistent bioaccumulative toxic; TRI = Toxic Release Inventory; yr = year

Table 11. TRI Chemicals Manufactured from Non-Motor Vehicle Diesel Fuel and Gasoline Combustion at NBSD (2020)

CAS #	TRI Chemical	PBT	Emission Factor (lb/MMBTU)	Decimal Equivalent (lb/MMBTU)	2020 Diesel and Gasoline Fuel Use (MMBTU/yr)	Chemical Emissions (lb/yr)	TRI Threshold Exceeded?
71-43-2	Benzene	No	9.33 E-04	0.000933	13,971	13.0	No
108-88-3	Toluene	No	4.09 E-04	0.000409	13,971	5.7	No
1330-20-7	Xylenes	No	2.85 E-04	0.000285	13,971	4.0	No
115-07-1	Propylene	No	2.58 E-03	0.00258	13,971	36.0	No
106-99-0	1,3-Butadiene	No	<3.91 E-05	0.00003909	13,971	0.5	No
50-00-0	Formaldehyde	No	1.18 E-03	0.00118	13,971	16.5	No
75-07-0	Acetaldehyde	No	7.67 E-04	0.000767	13,971	10.7	No
107-02-8	Acrolein	No	<9.25 E-05	0.00009249	13,971	1.3	No
91-20-3	Naphthalene	No	8.48 E-05	0.0000848	13,971	1.2	No
85-01-8	Phenanthrene	No	2.94 E-05	0.0000294	13,971	0.4	No
120-12-7	Anthracene	No	1.87 E-06	0.00000187	13,971	0.0	No
191-24-2	Benzo(g,h,l)perylene	Yes 10 lb/yr	<4.89 E-07	0.000000488	13,971	0.0	No
Polycyclic Aromatic Compounds Category (100 lb/yr threshold)							
56-55-3	Benz(a)anthracene	PAC	1.68E-06	0.00000168	13,971	0.0	No < 100 lb/yr
50-32-8	Benzo(a)pyrene	PAC	1.88E-07	0.000000188	13,971	0.0	
205-99-2	Benzo(b)fluoranthene	PAC	<9.91E-08	0.000000099	13,971	0.0	
205-82-3	Benzo(k)fluoranthene	PAC	<1.55E-07	0.000000155	13,971	0.0	
53-70-3	Dibenzo(a,h,)anthracene	PAC	<5.83E-07	0.000000583	13,971	0.0	
193-39-5	Indeno(1,2,3-cd)pyrene	PAC	<3.75E-07	0.000000375	13,971	0.0	
					PAC Total	0.0	

BTU = British thermal unit(s); lb = pound(s); MMBTU = million BTU; PAC = polycyclic aromatic compound;
PBT = persistent bioaccumulative toxic; TRI = Toxic Release Inventory; yr = year

Diesel fuel: 139,200 BTU/gal

Gasoline: 125,000 BTU/gal

Total diesel fuel use in non-motor vehicles for 2020 = 100,157 gal

Total gasoline use in non-motor vehicles for 2020 = 230 gal

[(139,200 BTU/gal x 100,157 gal/yr) + (125,000 BTU/gal x 230 gal/yr)] x 1 MMBTU/1,000,000 BTU = 13,971 MMBTU/yr

9.0 FORM R CALCULATIONS – LEAD

9.1 Lead at NBSD SAR

The TRI-DDS was used to support the TRI release calculations for the SAR. Based on munitions type and usage quantity, TRI-DDS calculates chemical-specific "air releases" and "non-air releases" for ranges using DoD-developed emission factors, mass balance assumptions, and munitions constituent data.

9.1.1 Air Releases from the NBSD SAR

The air releases value is the amount of chemical expected to be released to air either as a point source (indoor range activity) or fugitive source (outside range activity). Because the NBSD SAR is located indoors, all air emissions are reported as stack or point air releases on the Form R. Per the TRI-DDS instructions, metal air release estimates are based on a mass balance approach, or Code C, on Form R.

TRI-DDS indicates that air releases of lead from the NBSD SAR were 0.0 lb in 2020. Therefore, because all range activities took place indoors, stack or point air releases were reported to be 0.0 lb on the Form R.

9.1.2 Non-Air Releases from the NBSD SAR

Potential chemical releases to land, water, and/or transfers offsite are estimated using the quantity of non-air releases from TRI-DDS, augmented with user knowledge regarding the type of range, use of bullet traps, and range clearance activities performed during the reporting year. Releases onsite to land from an indoor range are reported as "Not Applicable" (NA) on the Form R because there is no potential means for release. Releases to water are also reported as NA because there is no potential for release. As such, non-air releases for an indoor range represent transfers offsite of waste debris from range cleanup events and material captured by bullet traps.

The NBSD SAR is an indoor small arms range (pistol and rifle) with a bullet trap equipped for capturing and separating projectiles for metal reclamation. The captured bullets are collected and periodically sent offsite for metal recycling. Periodically, the range is also cleaned of any debris that may accumulate from range activities (e.g., ammunition wads from shotgun shells, bullet fragments, target fragments), and this material is sent offsite for disposal as hazardous waste.

TRI-DDS calculated 2,831.8 lb of lead non-air releases for the NBSD SAR in 2020. At the end of 2019, it was estimated that no lead was left in the bullet traps because the most recent range clearance took place near the end of that year. Therefore, the total amount of lead to be accounted for in 2020 is 2,831.8 lb.

The Regional Recycling Operations Center at NBSD reported receiving shipments of range lead from the NBSD SAR in 2020.[20] The total weight was 3,872 lb, with the most recent shipment occurring in December 2020. This material was sold to the highest bidder among various private metal recycling companies. Therefore, the recycled range lead amount was reported on Form R as 3,872 lb transferred offsite for recycling in 2020.

[20] Range lead shipments are tracked by Regional Recycling Operations Center personnel and provided via email by Javier Garcia May 24, 2021.

The range lanes and exhaust filtration system were also cleaned periodically in 2020 by NAVFAC SW personnel to replace high-efficiency particulate air (HEPA) filters, remove target debris from lanes, and vacuum. This waste stream is sent offsite as hazardous waste for disposal. Based on 2020 waste turn-in documents, these activities generated 207 lb of lead-contaminated material that were shipped to the U.S. Ecology facility in Beatty, Nevada (NV) (USEPA ID # NVT330010000) for disposal. This waste material comprises primary HEPA filters, pre-filters, personal protective equipment, and target material. The profile for this waste stream states that this material could contain from 0 to 5% lead by weight.[21] Using the high end of this range, it is estimated the amount sent offsite for disposal is as follows:

- Lead transferred to U.S. Ecology = 207 lb range waste x 5% lead = 10.4 lb lead

The quantity of NBSD range lead reported as received by the Regional Recycling Center was greater than lead non-air releases calculated by TRI-DDS, which indicates a mass balance data conflict. Because the data conflict cannot be resolved, the greater value (3,872 lb) provided by the Regional Recycling Center was used as the estimated quantity sent offsite for recycle on the Form R.

5.1 Releases to air (fugitive/non-point source) = NA
5.2 Releases to air (stack/point source) = 0 lb
6.2.1 Transfers to offsite locations (U.S. Ecology) = 10.4 lb
6.2.2 Transfers to offsite locations (Regional Recycling Operations Center) = 3,872 lb

9.2 Lead at the Remainder of NBSD

As presented in Tables 8 and 9, the following organizations other than the SAR used lead in 2020:

- SWRMC (SUPSHIP) used 0.2 lb in abrasive blasting material.
- HAZMIN Center issued 6.0 lb of lead as follows:
  - SWRMC (SIMA) work center in Building 3418 used 6.0 lb of lead in injector test oils for laboratory equipment according to the ERP report. This material use would be exempt under the laboratory activity exemption.
- 8.1 lb of lead must be accounted for in the NBSD OW.

Lead releases from these operations must be accounted for in a Form R separate from that of the SAR, per Navy TRI policy.

For the SWRMC (SUPSHIP) abrasive blasting operations, it is assumed that 95% of the abrasive material is captured and sent offsite, and 5% is released to air during operations. The material not released to air is sent offsite for reuse (not reported on the Form R because the material is directly reused) to Kleen Industrial Services (a division of Kleen Blast).[22] The calculations for lead quantities for the SWRMC (SUPSHIP) abrasive blasting operations are as follows:

- 0.2 lb lead x 0.05 = 0.0 lb released to air
- 0.2 lb lead x 0.95 = 0.2 lb solid waste offsite direct reuse

[21] NAVFAC SW San Diego Hazardous Waste Profile for HT43, Debris & Media, Lead Contaminated from Gun Range (wood, lead, plastic, and foam) lists chemical composition of lead at 0 to 5%. Profile provided by Gilberto Orozco, NES Profile Specialist, to Natalie Baum, MMEC Group, on May 26, 2021.

[22] Based on email from Paul Clifford, SWRMC Air Program Manager, to Natalie Baum, MMED Group, on August 31, 2020.

Wastewater collected from the July 2020 ship fire was analyzed for metals, and lead was detected in the sample. A total of 473,000 gal of wastewater were collected and contained 37 µg/L of lead, which yields:

- 473,000 gal x 37 µg/L x 3.78 L/gal x 0.0022 lb/g ÷ 1,000,000 µg/g = 0.1 lb of lead transferred offsite to U.S. Ecology

This amount will also be reported in Section 8.8 of the Form R.[23]

As calculated in Section 6.6, an estimated 8.1 lb of lead entered the NBSD OW in 2020. Of that quantity, 2.6 lb were in the recovered oil (Table 5) (not reported on the Form R because the oil is sold as a product), 0.3 lb was transferred to the Publicly Owned Treatment Works (POTW) in wastewater (Table 6), and 5.2 lb (Table 7) were transferred offsite in dewatered OW sludge to U.S. Ecology.

Additionally, the amount of lead released to air from non-mobile combustion sources must be included. From Section 8.0, Table 10, this quantity totaled 0.0 lb.

In summary, the following are the quantities reported on the NBSD Form R for lead:

- 0.0 lb stack emissions to air
- 0.1 + 5.2 = 5.3 lb transferred offsite to U.S. Ecology (disposal)
- 0.3 lb transferred to POTW

10.0 TRI FORM R REPORTS

NBSD is required to report lead under EPCRA Section 313 for RY2020. Per DoD TRI policy, separate Form Rs for lead are required for (1) the NBSD SAR, and (2) the remainder of NBSD. These Form R reports will be submitted to both the USEPA and the State of California by July 1, 2021.

11.0 KEY CHANGES FROM PRECEDING YEAR

The amount of munitions fired at the SAR in 2020 was 15.7% greater than the amount fired in 2019; however, the amount of range lead sent offsite for recycling remained consistent from 3,840 lb in 2019 to 3,872 lb in 2020.

The quantity of lead estimated in debris sent offsite from the SAR decreased from 142.8 lb in 2019 to 10.4 lb in 2020. This decease was due to a reduction in the percentage of lead assumed to be in the waste (25% to 5%) and a lesser quantity of range debris waste removed from SAR (571 lb in 2019 to 207 lb in 2020). The change in percentage of lead assumed to be in the range debris waste was made to better match the hazardous waste profile for this waste stream.

The releases of lead from the remainder of NBSD were consistent with those from the previous reporting year.

[23] Section 8.8 includes quantities of toxic chemicals disposed of or otherwise released onsite or managed as a waste offsite because of one-time events or remedial actions not associated with the production process. Toxic Chemical Release Inventory Reporting Forms and Instructions Revised 2020 Version, EPA 740-B-21-001, March 2021, page 84.